



ppb  
UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/942,328	08/28/2001	Padmanabha I. Venkitakrishnan	HP-10008019-1	7710

7590 01/22/2004

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER

KIM, HONG CHONG

ART UNIT

PAPER NUMBER

2186

DATE MAILED: 01/22/2004

2

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/942,328	VENKITAKRISHNAN ET AL.
	Examiner	Art Unit
	Hong C Kim	2186

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 20 August 2001.

2a) This action is FINAL.      2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 1-21 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 1,2 and 11-21 is/are rejected.

7) Claim(s) 3-10 is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. §§ 119 and 120

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:

    1. Certified copies of the priority documents have been received.

    2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

    3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

13) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) The translation of the foreign language provisional application has been received.

14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

#### Attachment(s)

1) Notice of References Cited (PTO-892)

2) Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_

4) Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_

5) Notice of Informal Patent Application (PTO-152)

6) Other: \_\_\_\_\_

**Detailed Action**

1. Claims 1-21 are presented for examination. This office action is in response to the application filed on 8/28/01.
2. Applicants are reminded of the duty to disclose information under 37 CFR 1.56.

***Claim Objections***

3. Claims 19-20 are objected to because of the following informalities: There are two claim 19's and claim 20 should be changed to claim 21. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

5. Claim 11 is rejected under 35 U.S.C. 102(a) as being anticipated by Carpenter et al. (Carpenter) US Patent No. 6,115,804.

As to claim 11, Carpenter discloses the invention as claimed. Carpenter discloses a cache coherency system comprising: a plurality of cache memories (col. 3 lines 50-51) including a

cache line for storing information; a plurality of processor cores (Fig. 10's) on a single substrate for processing instructions and information stored in said plurality of cache memories wherein one of said plurality of processor cores is coupled to and associated with one of said plurality of cache memories; and a coherency system bus (col. 5 lines 3-5) for providing coherency in accordance with a memory coherency maintenance method, wherein said memory coherency maintenance method maintains coherency throughout a shared memory model including said plurality of cache memories.

***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-2, 12-17, and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Carpenter et al. (Carpenter) US Patent No. 6,115,804 in view of Parks US Patent No. 6,356,983.

As to claim 1, Carpenter discloses the invention as claimed. Carpenter discloses a cache coherency maintenance system, comprising: a plurality of cache memories including a cache line for storing information (col. 3 lines 50-51); a plurality of processor cores (Fig. 10's) included on

a single substrate for processing instructions and information stored in said plurality of cache memories wherein one of said plurality of processor cores is coupled to and associated with one of said plurality of cache memories; and a coherency system bus (col. 5 lines 3-5) for communicating information between said plurality of cache memories and said plurality of processor cores in accordance with a coherency protocol, wherein said coherency protocol state with said cache line. However, Carpenter does not specifically disclose a pending state. Parks discloses a pending state (col. 9 lines 55-60) for the purpose of maintaining data consistency.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a pending state of Parks in the teaching of Carpenter thereby results in an invention as claimed.

As to claim 2, Parks further discloses wherein said pending state locks out access to said cache line when said cache line is in transition and continues to lock out access to said cache line until appropriate responses are received indicating continuation of a cache line transaction will not result in race conditions that cause information coherency problems (col. 3 lines 1-3 and col. 9 lines 50-60).

As to claim 12, Carpenter discloses the invention as claimed. Carpenter further discloses attempting to access information in a first memory (col. 9 lines 10-12); changing to a modify state; transitioning to an invalid state; and shifting to a shared state (Table VI). However,

Carpenter does not specifically disclose a pending state. Parks discloses a pending state (col. 9 lines 55-60) for the purpose of maintaining data consistency.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a pending state of Parks in the teaching of Carpenter thereby results in an invention as claimed.

As to claim 13, Parks further discloses wherein said memory coherency maintenance method comprises a pending state that locks out access to information included in one of said plurality of caches while transitioning between other states (col. 3 lines 1-3 and col. 9 lines 50-60).

As to claim 14, Parks further discloses wherein one of said plurality of processors attempts to access information from an external cache (col. 2 lines 25-28).

As to claim 15, Carpenter further discloses wherein a modified state is entered in one of said plurality of cache memories and the information is put into an invalid state in the remaining of said plurality of cache memories (Table VI).

As to claim 16, Carpenter further discloses an embedded memory for storing information and data for downloading to said plurality of cache memories and utilization by said plurality of

processors (col. 4 lines 29+).

As to claim 17, Carpenter further discloses wherein said cache line is in a shared state and comprises the same value as in said embedded main memory (Table VI).

As to claim 18, Carpenter discloses the invention as claimed. Carpenter discloses a cache coherency method comprising: invalidating said cache line; modifying said cache line; and sharing said cache line (Table VI). However, Carpenter does not specifically disclose pausing actions to a cache line. Parks discloses pausing actions to a cache line (col. 9 lines 55-60) for the purpose of maintaining data consistency.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate pausing actions to a cache line of Parks in the teaching of Carpenter thereby results in an invention as claimed.

As to claim 19, Carpenter further discloses wherein said sharing a cache line includes a sharing control process further comprises: permitting internal reading of said cache line without shared bus activity; and producing a invalid cache line transaction when said cache line is internally written (Table VI).

As to claim 20, Parks further discloses producing an internal access line miss; and

causing a processor core to fetch said cache line information from a on chip system bus (OCSB) (col. 2 lines 24+).

As to claim 21, Carpenter further discloses wherein modifying said cache line produces a modified cache line state and includes a more recent value than a main memory (Table VI).

***Allowable Subject Matter***

8. Claims 3-10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Conclusion***

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See attached PTO-892.

10. a shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) days from the mail date of this letter. Failure to respond within the period for response will result in **ABANDONMENT** of the application (see 35 USC 133, MPEP 710.02, 710.02(b)).

11. Applicants are requested to number each line of each claim starting with line number one to provide easier communication in the future.

12. When responding to the office action, Applicant is advised to clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. He or she must also show how the amendments avoid such references or objections. See 37 C.F.R. § 1.111(c).

13. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and page numbers in the application and/or references cited to assist examiner to locate the appropriate paragraphs.

14. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Hong Kim whose telephone number is (703) 305-3835. The Examiner can normally be reached on the weekdays from 8:30 AM to 5:00 PM.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Matt Kim, can be reached on (703) 305-3821.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3900.

15. **Any response to this action should be mailed to:**

Commissioner of Patents and Trademarks  
Washington, D.C. 20231

**or faxed to TC-2100:**  
(703) 872-9306

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

1/20/04  
HK  
Primary Patent Examiner  
January 20, 2004